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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,469	01/28/2004	Koji Furukawa	Q78016	9435
23373	7590	09/07/2006	EXAMINER	
SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			UHLENHAK, JASON S	
			ART UNIT	PAPER NUMBER
			2853	

DATE MAILED: 09/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/765,469	<b>Applicant(s)</b> FURUKAWA, KOJI
	<b>Examiner</b> Jason Uhlenhake	<b>Art Unit</b> 2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 5, 6, 11-12 are rejected under 35 U.S.C. 103(a) as being obvious over Murakami et al (U.S. Pat. 6,15,844) in view of Brescia et al (U.S. Pat. 4,502,054).

#### ***Murakami discloses:***

- ***regarding claim 1***, ink jet head for recording an image on recording medium by ejecting ink containing charged fine particles by means of an electrostatic force (Abstract) comprising:
  - ink guide whose tip end portion is directed toward a side of said recording medium; ink flow path that supplies the ink to said ink guide (Abstract; Column 3, Line 56 – Column 4, Line 9)
  - ejection electrode that comprises a surrounding electrode arranged so as to surround an outer periphery of said ink guide with a predetermined spacing, and ejects the ink guided from said ink flow path to the tip end portion of said ink guide by means of the electrostatic force (Figure 21; Column 5, Lines 14 - 47)
- ***regarding claim 5***, wherein said ink guide is arranged on a head substrate (41); ink flow path is formed between said head substrate (41) and an

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insulating substrate (13) arranged so as to be spaced apart from said head substrate (41) by a predetermined distance (Figure 20)

- through holes (14) are formed in said insulating substrate (13); ink guide has said tip end portion protruding on side of said recording medium from one of the thorough holes formed in said insulating substrate (13) and guides the ink flowing in said ink flow path from said ink flow path to said tip end portion (Figure 20)

- **regarding claim 6**, wherein a contact angle of a surface of said ink guide (50) in at least a portion existing in through hole with respect to the ink is set larger than a contact angle of an inner wall surface of said through hole (14) with respect to the ink (Figure 19)

- **regarding claim 11**, ink contains charged fine particles which are dispersed in a solvent, and said ejection electrode is provided on a side of said insulating substrate in said ink flow path (Column 3, Line 56 – Column 4, Line 9)

- **regarding claim 12**, tip end portion of said ink guide has an affinity (attraction) for the ink (Column 2, Lines 36-46; Lines 56-60)

***Murakami et al does not disclose expressly:***

- **regarding claim 1**, a ratio between an effective inside diameter of surrounding electrode and a distance from said surrounding electrode to end of ink guide on side of recording medium is set in a range of 1 : 0.5 to 1 : 2

- **regarding claim 2**, surrounding electrode is substantially circular electrode, and said effective inside diameter is an average inside diameter

***Brescia et al discloses:***

- **regarding claim 1**, a ratio between an effective inside diameter of surrounding electrode and a distance from said surrounding electrode to end of ink guide on side of recording medium is set in a range of 1 : 0.5 to 1 : 2 (Figures 3, 3A; Column 4, Lines 7 – 24), for the purpose of supplying energy required for the jet and obtain good wear resistance.
- **regarding claim 2**, surrounding electrode is substantially circular electrode, and said effective inside diameter is an average inside diameter (Column 3, Lines 54 – 59; Column 4, Lines 7 – 24), for the purpose of stabilizing the ejection of ink from the ink jet head.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of a ratio between an effective inside diameter of surrounding electrode and a distance from said surrounding electrode to end of ink guide on side of recording medium is set in a range of 1 : 0.5 to 1 : 2; surrounding electrode is substantially circular electrode, and said effective inside diameter is an average inside diameter as taught by Brescia et al into the device of Murakami et al, for the purpose of supplying the energy required for the jet and obtain good wear resistance, and to stabilize the ejection of ink from the ink jet head.

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al (U.S. Pat. 6,158,844) in view of Brescia et al (U.S. Pat. 4,502,054) and Miroku (U.S. Pat. 4,633,328).

**Murakami discloses:**

- **regarding claim 3**, ink jet head for recording an image on recording medium by ejecting ink containing charged fine particles by means of an electrostatic force (Abstract) comprising:

- ink guide whose tip end portion is directed toward a side of said recording medium; ink flow path that supplies the ink to said ink guide (Abstract; Column 3, Line 56 – Column 4, Line 9)

***Murakami does not disclose expressly:***

- **regarding claim 3**, ejection electrode that comprises side-by-side electrodes arranged on both sides of said ink guide so as to oppose each other with a predetermined spacing
- a ratio between an effective spacing between said side-by-side electrodes and a distance from said side-by-side electrodes to end of said ink guide on side of said recording medium set in a range of 1 : 0.7 to 1 : 2.8
- **regarding claim 4**, wherein side-by-side electrodes are substantially parallel electrodes, and said effective spacing is an average electrode spacing

***Brescia et al discloses:***

- **regarding claim 3**, a ratio between an effective spacing between said side-by-side electrodes and a distance from said side-by-side electrodes to end of said ink guide on side of said recording medium set in a range of 1 : 0.7 to 1 : 2.8 (Figures 3, 3A; Column 4, Lines 7 – 24), for the purpose of supplying the energy required for the jet and obtain good wear resistance.

***Miroku discloses:***

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- **regarding claim 3**, ejection electrode that comprises side-by-side electrodes (4) arranged on both sides of said ink guide so as to oppose each other with a predetermined spacing (Figure 3; Abstract; Column 1, Lines 5 – 11; Lines 45 – 56), for the purpose of suitably charging ink drops determined with respect to a spacing defined between ink droplets.

- **regarding claim 4**, wherein side-by-side electrodes are substantially parallel electrodes, and said effective spacing is an average electrode spacing Figure 3; Abstract; Column 1, Lines 52– 68), for the purpose of properly spacing the electrodes.

At the time the invention was made, it would have been obvious for a person of ordinary skill in the art to incorporate the teaching of a ratio between an effective spacing between said side-by-side electrodes and a distance from said side-by-side electrodes to end of said ink guide on side of said recording medium set in a range of 1 : 0.7 to 1 : 2.8; ejection electrode that comprises side-by-side electrodes arranged on both sides of said ink guide so as to oppose each other with a predetermined spacing; side-by-side electrodes are substantially parallel electrodes, and said effective spacing is an average electrode spacing as taught by Brescia et al and Miroku into the device of Murakami, for the purpose of supplying the energy required for the jet and obtain good wear resistance; purpose of properly spacing the electrodes; and purpose of suitably charging ink drops determined with respect to spacing defined between ink droplets.

Claims 7,10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al (U.S. Pat. 6,158,844) as modified by Brescia et al (U.S. Pat. 4,502,054) and further in view of Miura et al (U.S. Pat. 4,801,955)

***Murakami as modified by Brescia et al discloses all of the claimed limitations except for the following:***

- ***regarding claim 7***, wherein surface of ink guide in at least the portion existing in said through hole has ink-repellent property
- ***regarding claim 10***, wherein ink guide in at least the portion existing in through hole is configured with a ink-repellent member, and said surface of said ink guide in at least the portion existing in said through hole is processed with a ink

***Miura discloses:***

- ***regarding claim 7***, wherein surface of ink guide in at least the portion existing in said through hole has ink-repellent property (Column 9, Lines 32-48), for the purpose of repelling ink particles which might return to the nozzle opening
- ***regarding claim 10***, wherein ink guide in at least the portion existing in through hole is configured with a ink-repellent member, and said surface of said ink guide in at least the portion existing in said through hole is processed with a ink (Column 9, Lines 32-48), for the purpose of repelling ink particles which might return to the nozzle opening

At the time the invention was made, it would have been obvious for a person of ordinary skill in the art to incorporate the teaching of a contact angle of a surface of said ink guide in at least a portion existing in through hole with respect to the ink is set larger



than a contact angle of an inner wall surface of said through hole with respect to the ink as taught by Miura et al into the device of Murakami as modified by Brescia et al, for the purpose of protecting an ink head without damaging the projecting portion and repelling ink particles which might return to the nozzle opening.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al (U.S. Pat. 6,158,844) as modified by Brescia et al (U.S. Pat. 4,502,054) and further in view of Miyashita et al (U.S. Pub. 2002/0136823).

***Murakami as modified by Brescia et al discloses all of the claimed limitations except for the following:***

- ***regarding claim 8***, wherein a difference between said contact angle of said surface of ink guide in at least the portion existing in through hole with respect to the ink and said contact angle of inner wall surface of said through hole with respect to the ink is set at not less than 10 degree
- ***regarding claim 9***, contact angle of surface of said ink guide in at least the portion existing in said through hole with respect to the ink is set at not less than 20 degree

***Miyashita et al discloses:***

- ***regarding claim 8***, wherein a difference between said contact angle of said surface of ink guide in at least the portion existing in through hole with respect to the ink and said contact angle of inner wall surface of said through hole with respect to the ink is set at not less than 10 degree (Paragraphs 0093 – 0094), for the purpose of

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carrying out a precise patterning by suppressing the bend in the jetted direction of the composition.

- **regarding claim 9**, contact angle of surface of said ink guide in at least the portion existing in said through hole with respect to the ink is set at not less than 20 degree (Paragraphs 0093 – 0094), for the purpose of carrying out a precise patterning by suppressing the bend in the jetted direction of the composition.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of a difference between said contact angle of said surface of ink guide in at least the portion existing in through hole with respect to the ink and said contact angle of inner wall surface of said through hole with respect to the ink is set at not less than 10 degree; contact angle of surface of said ink guide in at least the portion existing in said through hole with respect to the ink is set at not less than 20 degree as taught by Miyashita et al into the device of Murakami et al as modified by Brescia et al, for the purpose of carrying out a precise patterning by suppressing the bend in the jetted direction of the composition.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al (U.S. Pat. 6,158,844) as modified by Brescia et al (U.S. Pat. 4,502,054) and further in view of Jonsson (U.S. Pat. 6,361,147)

***Murakami as modified by Brescia et al does not disclose expressly:***

- **regarding claim 13**, a guard electrode which is provided between adjacent ejection electrodes and suppresses electric field interferences occurring between the adjacent ejection electrodes

***Jonsson discloses:***

- **regarding claim 13**, a guard electrode which is provided between adjacent ejection electrodes and suppresses electric field interferences occurring between the adjacent ejection electrodes (Column 13, Lines 45-52) , for the purpose of shielding the electrodes from one another, thereby preventing undesired interaction between electrostatic fields produced by two adjacent electrodes

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of a guard electrode that is provided between adjacent ejection electrodes and suppresses electric field interferences occurring between the adjacent ejection electrodes as taught by Jonsson into the device of Murakami as modified by Brescia, for the purpose of shielding the electrodes from one another, thereby preventing undesired interaction between electrostatic fields produced by two adjacent electrodes

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being obvious over Murakami et al (U.S. Pat. 6,158,844) in view of Brescia et al (U.S. Pat. 4,502,054) and Suetsugu et al (U.S. Pat. 5,975,684).

***Murakami discloses:***

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- **regarding claim 14**, ink jet head for recording an image on recording medium by ejecting ink containing charged fine particles by means of an electrostatic force (Abstract), comprising:

- two or more ink guides, a tip end portion being directed toward a side of said recording medium; one or more ink flow paths that supplies the ink to said ink guide (Figure 21; Abstract; Column 3, Line – Column 4, Line 9)

- two or more ejection electrodes, each ejection electrode comprises a surrounding electrode arranged so as to surround an outer periphery of said ink guide with a predetermined spacing, and ejects the ink guided from said ink flow path to the tip end portion of said ink guide by means of the electrostatic force (Figure 21; Column 5, Lines 14 - 47)

- **regarding claim 15**, means for holding recording medium; means for relatively moving said ink jet head and said recording medium (Column 1, Lines 34-41)

**Murakami does not disclose expressly:**

- **regarding claim 14**, a ratio between an effective inside diameter of surrounding electrode and a distance from said surrounding electrode to end of ink guide on side of recording medium is set in a range of 1 : 0.5 to 1 : 2

- **regarding claim 15**, means for applying a predetermined bias voltage between ejection electrode and said recording medium

- means for applying a predetermined ejection voltage to said ejection electrode in accordance with said image to be recorded on said recording medium

***Brescia et al discloses:***

- ***regarding claim 14***, a ratio between an effective inside diameter of surrounding electrode and a distance from said surrounding electrode to end of ink guide on side of recording medium is set in a range of 1 : 0.5 to 1 : 2 (Figures 3, 3A; Column 4, Lines 7 – 24)

***Suetsugu et al discloses:***

- ***regarding claim 15***, means for applying a predetermined bias voltage between ejection electrode and said recording medium (Column 5, Lines 25-35), for the purpose of achieving a stable printing operation with a high printout quality.

- means for applying a predetermined ejection voltage to said ejection electrode in accordance with said image to be recorded on said recording medium (Column 5, Lines 5-14), for the purpose of achieving a stable printing operation with a high printout quality.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of a ratio between an effective inside diameter of surrounding electrode and a distance from said surrounding electrode to end of ink guide on side of recording medium is set in a range of 1 : 0.5 to 1 : 2 as taught by Brescia et al and Suetsugu into the device of Murakami, for the purpose of supplying the energy required for the jet and to obtain good wear resistance and achieving a stable printing operation with a high printout quality..

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being obvious over Murakami et al (U.S. Pat. 6,158,844) in view of Brescia et al (U.S. Pat. 4,502,054), Suetsugu et al (U.S. Pat. ,975,684) and Miroku (U.S. Pat. 4,633,328).

***Murakami discloses:***

- ***regarding claim 16***, ink jet head for recording an image on recording medium by ejecting ink containing charged fine particles by means of an electrostatic force (Abstract) comprising:
  - two or more ink guides, a tip end portion is directed toward a side of said recording medium; one or more, ink flow paths that supplies the ink to two or more ink guides (Figure 21; Abstract; Column 3, Line – Column 4, Line 9)
- ***regarding claim 17***, means for holding recording medium; means for relatively moving said ink jet head and said recording medium (Column 1, Lines 34-41)

***Murakami does not disclose expressly:***

- ***regarding claim 16***, two or more ejection electrode that comprises side-by-side electrodes arranged on both sides of said ink guide so as to oppose each other with a predetermined spacing
  - a ratio between an effective spacing between said side-by-side electrodes and a distance from said side-by-side electrodes to end of said ink guide on side of said recording medium set in a range of 1 : 0.7 to 1 : 2.8
- ***regarding claim 17***, means for applying a predetermined bias voltage between ejection electrode and said recording medium

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- means for applying a predetermined ejection voltage to said ejection electrode in accordance with said image to be recorded on said recording medium

***Brescia et al discloses:***

- ***regarding claim 16***, a ratio between an effective spacing between said side-by-side electrodes and a distance from said side-by-side electrodes to end of said ink guide on side of said recording medium set in a range of 1 : 0.7 to 1 : 2.8 (Figures 3, 3A; Column 4, Lines 7 – 24), for the purpose of supplying the energy required for the jet and obtain good wear resistance.

***Miroku discloses:***

- ***regarding claim 16***, two or more ejection electrodes that comprises side-by-side electrodes (4) arranged on both sides of said ink guide so as to oppose each other with a predetermined spacing (Figure 3; Abstract; Column 1, Lines 5 – 11; Lines 45 – 56), for the purpose of suitably charging ink drops determined with respect to a spacing defined between ink droplets.

***Suetsugu et al discloses:***

- ***regarding claim 17***, means for applying a predetermined bias voltage between ejection electrode and said recording medium (Column 5, Lines 25-35), for the purpose of achieving a stable printing operation with a high printout quality.

- means for applying a predetermined ejection voltage to said ejection electrode in accordance with said image to be recorded on said recording medium (Column 5, Lines 5-14), for the purpose of achieving a stable printing operation with a high printout quality.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of a ratio between an effective inside diameter of surrounding electrode and a distance from said surrounding electrode to end of ink guide on side of recording medium is set in a range of 1 : 0.7 to 1 : 2.8; ejection electrode that comprises side-by-side electrodes arranged on both sides of said ink guide so as to oppose each other with a predetermined spacing as taught by Brescia et al, Suetsugu and Miroku into the device of Murakami, for the purpose of supplying the energy required for the jet and obtain good wear resistance; purpose of properly spacing the electrodes; and purpose of suitably charging ink drops determined with respect to spacing defined between ink droplets, and achieving a stable printing operation with a high printout quality.




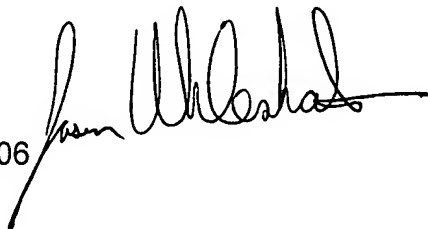
**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Uhlenhake whose telephone number is (571) 272-5916. The examiner can normally be reached on Monday - Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JSU  
August 29, 2006



**STEPHEN MEIER**  
**SUPERVISORY PATENT EXAMINER**